LEARNING FROM SME SITE MANAGERS THROUGH DEBRIEFING

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Abstract
Site managers acquire knowledge through solving complex problems in their day-to-day work. However, the construction industry does not capture this valuable experience formally for the greater benefit of all. If this body of knowledge could be collected, structured and disseminated, there would be significant benefits to the construction industry at large. A research is reported here where the tacit knowledge residing with some site managers of 'small and medium enterprises' (SMEs) is being explicated. 32 site managers from 12 construction SMEs are involved in the research, where stories are used as a basis of recollecting previous events. The participating site managers are debriefed on their stories in order to explicate learning from the events and transform the knowledge gained into a form that is accessible to a wider audience. The preliminary debriefings carried out so far have succeeded in capturing tacit knowledge and extracting greater learning from the daily problem-solving events of these site managers.

Keywords: *dairy, debriefing, knowledge management, storytelling*

INTRODUCTION TO THE STUDY

In the construction industry, site managers and project managers solve complex problems in their day-to-day work by using their experiences and intuition, i.e. their tacit knowledge. Nevertheless, the industry has failed to acknowledge this practice never mind capturing it. The research discussed here concerns a robust approach for the management of knowledge by construction SMEs to improve their economic, social and sustainable performance.

Knowledge management is a complex process, involving the management of explicit and tacit knowledge (Nonaka and Takeuchi, 1995). Explicit knowledge can be articulated in formal language such as grammatical statements, mathematical expressions, specifications, manuals, etc. While explicit knowledge can be transmitted across individuals formally and easily, tacit knowledge is rather personal information embedded in individual memory and is often implicit. Tacit knowledge can be hard to articulate with formal language.

Evidence suggests that tacit knowledge contributes more to organisational innovations and competitiveness (Boyd and Belcher, 2002). Compared with explicit knowledge,

tacit knowledge is more difficult to access, communicate, share and audit and human behaviour is vital in its transmission (Nonaka and Takeuchi, 1995). If however this body of tacit knowledge can be collected, structured and disseminated, there would be significant benefits to users of that information. In this regard, our research is accessing the tacit knowledge of SME site managers for subsequent wider usage.

Rationale for the study

Hylton (2002) has indicated that SMEs are in need of knowledge management just as much as large enterprises. The reasons cited are that the world has changed rapidly over the past decade and continues to do so. There are more contenders for every dollar or profit, which puts great pressure on companies, large and small, to innovate and to develop products rapidly. Both innovation and rapid development require accelerated use of knowledge, i.e. knowledge that must be managed efficiently, effectively and securely. In this knowledge driven global economy, knowledge itself is a commodity that offers the only 'sustainable competitive edge'.

There are a plethora of knowledge management tools and solutions on the market. However, the increasing attention of knowledge management is unsurprisingly targeted at very large multinational organisations, with little at the SMEs, and even less at construction-related organisations. Thus our research is helping SMEs to implement knowledge management approaches.

In 2002, 99% of the UK construction companies had less than 59 staff, but employed 62% of the industry's workforce and, in monetary terms delivered 44% of the industry's workload (DTI, 2003). Compared with large companies, these SMEs are usually weak technologically, short of investment in innovation and development, and take a less-formal strategy in management. With limited and often very stretched resources, personnel in SMEs need to have a broad range of skills and experience to undertake multiple tasks (Sexton and Barrett, 2003). Therefore, there is an urgent need to develop knowledge management approaches suitable for construction SMEs. Such approaches of sharing knowledge or tapping into the knowledge pool must be simple, straightforward and efficient in order to encourage employees' participation and maximise the benefits of knowledge management (Alazmi and Zairi, 2003).

A THEORETICAL PERSPECTIVE

Knowledge management involves knowledge identification, creation, acquisition, transfer, sharing and exploitation. Knowledge management is vital for efficient working in projects and for improving organisational competitiveness (Egbu, 2000a; 2001). Knowledge management can also promote innovation and business entrepreneurship, help managing change, and emancipate and empower employees (Nonaka and Takeuchi, 1995; Egbu, 2000b; McAdam and McCreedy, 2000; DTI, 2000).

It is widely recognized that organizations often reinvent the wheel, thereby repeating mistakes and wasting resources (Robertson, 2002; Flar, 2002). This often happens when members of an organization are unable to refer to each other's work. On the other hand, learning takes place when knowledge that resides in one part of an organization is transferred effectively to other parts and used to either solve problems or provide new and creative insights (Goh, 2002). Learning does also occur when

knowledge moves from one organization to another. Knowledge management can facilitate both strands of learning.

It can be argued that while the subject matter of knowledge management is about managing knowledge, it also extends to changing entire business cultures and strategies of organizations to approaches that value learning and sharing knowledge. Therefore, knowledge management tends to concern people, processes, culture and technology (Flar, 2002).

Tacit knowledge

Polanyi (1996) made a distinction between tacit and explicit knowledge. Explicit knowledge is that which is capable of being stated clearly, while tacit knowledge concerns an awareness of things that we may not be able to tell. Tacit knowledge is developed through, and can concern, intangible factors such as personal belief, perspective, and the value system (Nonaka and Takeuchi, 1995). All knowledge is either tacit or rooted in tacit knowledge. A great deal of the know-how required for the implementation of diverse tasks is embodied in knowledge that is not written, i.e. it is mostly tacit (Koskinen, 2003).

Tacit knowledge is very complex and not generally available outside its possessor. While it is relatively easy to preserve and transmit explicit knowledge, tacit knowledge is more difficult to transmit. What is lacking at the moment is a complete understanding of effective knowledge transfer within organizations, especially where tacit knowledge is involved (Goh, 2002). Knowledge management helps, partly, to reduce the time spent in looking for relevant knowledge (Kakabadse *et al*., 2003).

Transferring tacit knowledge

Knowledge transfer is enhanced if the environment is right, i.e. right people involved, right conditions exist, right means are used and right actions are taken (Collison and Parcell, 2002). Knowledge transfer is carried out through people, objects or a combination of the two. This study concentrates on the capture and exploitation of tacit knowledge.

Tacit knowledge can be transmitted or transformed in the two ways shown in Figure 1. The key concepts contained in Figure 1 are:

- ***Socialization*** – sharing experiences (meetings, brainstorming, etc).
- *Internalization* – akin to reflection.
- ***Externalization*** – transforming tacit knowledge into explicit knowledge.
- *Combination* – reconfiguring existing knowledge to form new explicit knowledge.

Tacit knowledge may be transferred best through a greater use of interpersonal means and processes that are less structured. Some examples of these are mentoring, teamwork, chat rooms, personal intranets and face-to-face conversations such as group dialogues or personal reflections on experiences and lessons learned (Goh, 2002). Further avenues for transferring tacit knowledge include post-project reviews and consultant-led reports (Kransdorff, 1999), knowledge sharing meetings, publications in magazines and storytelling (Post, 2002). The investigation reported in this article is based on storytelling. Sometimes knowledge transformation and dissemination does take place through people telling stories about the events they have experienced.

Unveiling tacit knowledge through storytelling

'Aristotle' is said to have encouraged story telling as a way of defining justified true belief (Kakabadse, et al., 2003). The storytelling approach is very useful for capturing tacit knowledge and has been used successfully by both EduTech and NASA (Post, 2002).

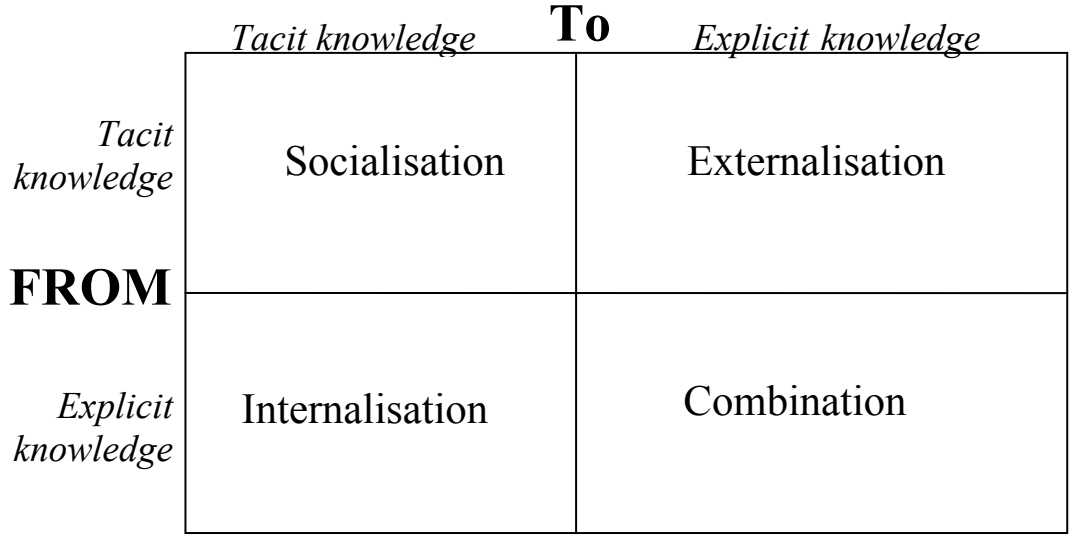

Figure 1: Models of Knowledge Creation (*Source: Nonaka, 2004*).

Stories are personal belongings, likewise tacit knowledge. Therefore, in storytelling, individuals have the opportunity to share what is personally theirs, i.e. the tacit knowledge they possess. In storytelling, lessons learnt previously are shared to the benefit of the listeners (Post, 2002).). In storytelling, the particular story told is used as a means to an end. Thus, the actual story is not as critical as the lessons learnt from it.

In storytelling, tacit knowledge is transformed into explicit knowledge by means of 'metaphors', which is a distinctive method of perception (Koskinen, 2003). Through metaphors, people put together what they know in new ways and begin to express what they know but cannot yet say. By the metaphorical approach, specific experiences are used to engender greater learning for present and future applications. This metaphorical approach uses imagination and symbols without the need for analysis or generalization, and provides an entry point into issues, which may be intimidating to confront head-on (Post, 2002). The use of metaphors in stories is highly effective in fostering direct commitment to the creative process in the early stages of knowledge creation.

Audio diary as a tool for capturing stories

A diary is a record of events, maintained by someone over time, which can then be collected and analysed (Burns and Grove, 2001). A diary provides an opportunity to record experiences, perceptions and feelings about daily operations relatively soon after they had occurred. A diary is thus a simple tool for encouraging people to capture events as they develop (Zimmerman and Weider, 1977).

Diaries could be written or oral. Written diary entries require writing skills and time for composition, which can act as barriers, especially in SME organisations. Audio

diaries overcome these shortcomings, and can be used in a manner similar to written diaries. Although some users might be reluctant to adopt audio devices initially, they tend to overcome this phobia after a few trials. Construction site personnel tend to be busy and might be unwilling to spare long periods of time to compose and write stories. Thus, our research decided to use audio devices for capturing stories.

Debriefing

Originally, debriefing was used in military campaigns and war games to question and examine persons who had returned from a mission or exercise, to establish what had occurred and then develop new strategies as a result of previous experience (Pearson and Smith, 1985). Now, debriefing refers to a purposeful reflection, which assists learners to develop generalisation and to transform experience into learning.

In debriefings, the what, why, how and when of things that happened is explored orally (Kransdorff, 1999). Debriefing combats corporate amnesia, provides a tool for inducting new employees as well as planning for a succession (Kransdorff, 1999). Debriefing is thus a powerful tool, which can make explicit any tacit learning so that it can be transferred to a wider audience and ultimately to the knowledge base of the industry.

The rationale behind debriefing is that individual learning can be enhanced by purposeful reflection. Through debriefings, several individual lessons can also be aggregated, validated and synthesized to produce organizational learning. It is this second operation of debriefing that involves the transformation of tacit knowledge to explicit knowledge thus formatting it for dissemination.

To facilitate learning from past experiences, individuals with tacit knowledge must be encouraged or motivated to divulge the information they possess, otherwise the objective will be defeated. As a step in this direction, corporate cultures must move from blame apportionment towards knowledge sharing (Kransdorff, 1999).

The study reported herein concerns knowledge management in construction SME organisations. In this regard, the tacit knowledge of site managers is captured initially and inadvertently by means of audio diaries. Through follow-up debriefings, greater learning from the diaries is either identified or reinforced.

THE RESEARCH METHODOLOGY

Action research

The study is tracking a number of projects being run by construction SME organisations. Each project is studied for six months in the first instance. Site managers from some construction SME organisations are involved, ranging in number, from 1 to 4 per company. The study includes projects in the development, design and construction phases so as to explore the suitability of knowledge management techniques in the different commercial and professional environments.

Construction practice communicates substantively by means of the spoken language. This form of communication is rich in meaning because of nuances of delivery, body language and context, which provide many dimensions of information useful for

practice. It is this multi-dimensional world of oral communication which contains much of the tacit knowledge and also the ability to transfer it. Therefore, it was proposed that audio diaries be used to capture past events in this research. The usage of audio diaries also minimises disruptions to the participants' daily work, thus encouraging their participation and cooperation.

As this research concerns learning from tacit knowledge, it is primarily focused on socialisation and externalisation (Figure 1). By means of socialisation, the research participants are explicating their tacit knowledge by telling stories. By means of debriefing and subsequent dissemination, greater learning from the stories is externalised. After a set of audio diary entries, usually between 2 and 4 in number, the participants are debriefed to analyse their learning and to provide a deeper interpretation of the events.

Research design

A qualitative approach is employed in this on-going study, because the stories are meant to yield rich qualitative data. According to Mason and Pauleen (2003) such responses can be compiled into a database and then analyzed according to standard qualitative coding principles. The analysis should, *and in this case does*, involve a detail evaluation of the responses (Dey, 1993).

Research instrument

In a prior study (Boyd and Robson, 1996), an approach to capturing, structuring and disseminating knowledge was tried and this has allowed the development of a comprehensive, yet simple, tool for knowledge management, which is suitable for SMEs. In this precursor, capturing knowledge involved two operations:

1. The recording of events; and,
2. Reflection and abstract conceptualisation of the events.

This prior investigation informed the manner in which to generate data in the current investigation.

A pilot study for the present investigation

Before SMEs were asked to provide data in the present research, a Project Manager with a consultant company in the west-midlands was asked to try the approach. This project manager recorded an event he had experienced in a building project. After listening to his story, an arrangement was made to debrief the storyteller a week afterwards.

The debriefing discussed issues such as circumstances underpinning the event, the feelings and actions of the storyteller, the reaction of other people involved in that project and the lessons learnt from the event. The pilot event collection through audio diary and subsequent debriefing were successful, and thus equipped the researchers with an effective tool for the current investigation.

Actual event collection through audio diaries

Research participants now tell us a story of a problem-solving event, which they have experienced. The participants are encouraged to dictate one story each week into a Dictaphone to explicate their personal knowledge and thinking. Participants are asked to record events, which they think are useful for learning. These events may be

challenging, successful, worrying, complicated, difficult, frustrating, or annoying. The events could also relate to technical issues, organisational process or relationships between people.

To facilitate the process, all the participants are provided a Dictaphone, set of tapes for storing information and pre-addressed and stamped envelopes for returning the stories to the researchers. A procedure manual is used to guide the audio diary recordings. In this regard, a set of structured but open questions is provided to help the participants record their stories, i.e.:

1) What happened?
2) What was the context of the event?
3) What should (not) have happened?
4) How did people react?
5) What did you feel?
6) What lesson did you learn?

So far, over two hundred audio diary entries have been collected. Given the possibility of loss, coupled with technological advances, these stories are stored on a hard drive and backed unto CDs. As confidentiality is always a concern, participants are assured that the information obtained from them would be kept strictly confidential and used for research purposes only. Data will not be made available to any third party or used in any published material, except in a disguised form. This undertaken was made to preserve the confidentiality of the participants and encourage authentic stories.

The sample of research participants

32 participants from 12 SME organisations are involved in the study. The business outlooks of the organisations involved are general contractors, design-build contractors, specialist contractors and consulting companies. All the participants were briefed thoroughly before they started providing stories. Each month, the storytellers are debriefed on their stories.

The debriefing

This paper concentrates on debriefing, which is informed by the event collection exercise through the audio diaries. The participants are debriefed after four or five audio diary recordings, to explore the significance of the events reported and to transform their inherent tacit knowledge in order to make it accessible to others.

A debriefing session lasts about one hour, and involves a review of the events with a question and discussion session. In order to make the debriefing more structured and to facilitate the data analysis, a set of questions was designed. These were refined with reference of the principles of debriefing as discussed by Pearson and Smith (1985) and the Department of the Army (1993). The subject matter of the questions is threefold:

1) The acknowledgement of the events, i.e. to review and clarify the events.
2) Reflection on the events: to explore the participants' pre-understanding of the events and the impact of the events.
3) Conceptualisation and generalisation from the events: to explicate what lessons have been learned and what participants would do differently in the future.

Sixty debriefings have been conducted with the research participants. It is now possible to disseminate the knowledge gained through these debriefings, within each company first, and to the construction industry subsequently. The ultimate objective is that the companies can operate this knowledge management approach by themselves.

Analysis of information

The analysis of the information generated from each story and its associated debriefing, where applicable, is tabulated. The information is subjected to multiple passes where keywords are identified and entered into a relevant column. The columns pertain to keyword-groupings, which represent the broad categories of process, technical and relationships.

The analytical process is iterative whereby keywords and categories are sorted, challenged, refined and redefined until all the information from the original responses are categorized satisfactorily. The responses, keywords and categories are then checked for bias or misinterpretation by another researcher. This iterative process is reviewed until all the researchers are satisfied with the interpretation of events.

KNOWLEDGE GAIN FROM A DEBRIEFING SESSION

As many debriefings have been held, space would not suffice to discuss them all. Thus, the following one example is used to illustrate knowledge gained from a debriefing session.

The event

A site manager provided a story on the construction of new changing rooms for a school. On a particular morning, a break-in was discovered where metal shower channels had been stolen. These channels were bespoke items that fitted the particular size of the changing rooms. Although the channels were not particularly expensive, their bespoke nature warranted a 5-week delivery time. Thus the theft had a dramatic consequence on the construction programme, i.e.:

- The screeding could not be undertaken as planned;
- The metal stud partitioning, which was designed to be fixed to the screed could not take place as well;
- The partitioning did carry the mechanical services for the showers; and,
- The partitioning was to be plasterboarded and tiled.

To minimise the delay, the partition was fixed to the sub-floor, leaving the screed out until the channels arrived but allowing the partitioning, tiling and most of the pipe work to be completed.

The key issues

Some of the issues established from this story are:

- Theft from sites is common as they cannot be made completely secure and are left unattended at night.
- The loss of apparently insignificant items can have a dramatic effect on programme.
- Subcontractors and craftspeople like significant work flows comprising full day's attendance because travelling and set-up times can be long.
- Rescheduling work into smaller chunks irritates trades as they do not get a flow of work and it increases their time overhead.

- Irritated craftspeople have the potential to produce a lower quality of work and are also less inclined to be flexible with any other changes.
- Small bits of work out of sequence are more difficult to coordinate and may not appear sufficiently important to subcontractors for them to attend as planned.
- Leaving work half done makes it vulnerable to damage which takes additional time to rectify and also can cause cross-trade arguments.
- In this case, leaving work half done creates a joint (screed, pipe work etc.) which may be vulnerable in the future, as the location of these makes them more difficult to form successfully.

The wider learning issues unravelled in the debriefing are:

- Theft from sites needs to be considered strategically.
- Long lead item, of low value, need to be protected as high value items.
- Leaving work half done is not satisfying and so may not be done with the highest quality.
- Interdependency of activities can have major effects on production.

Discussion

Debriefing, as in the foregoing example helps participants to be more analytical in their everyday experiences. Some of the events the participants have recorded are project or company related. However, some of them concern industry-wide problems, such as error or absence of design information, poor adherence to health and safety procedures on site, late payment, theft and vandalism on site. Their stories also concern technical, operational and relationship issues.

The occurrence of similar incidences in many locations and across companies provides a rich data mine for debriefing in order to explore the deeper meaning of the events. The construction industry can capture and share this existing knowledge widely to improve the performance of the whole industry. However, this suggestion warrants a culture-shift from the status quo.

Knowledge is rapidly becoming the most important asset of virtually all organisations. Construction is no exception. The ability to manage and exploit knowledge will be the main source of competitive advantage for the construction industry of the future. Effective knowledge management ensures more sustainable business practices, making organisations less vulnerable to economic cycles. 95% of construction organisations are SMEs, thus holding a vast amount of tacit knowledge. It is therefore worthwhile to capture this body of knowledge for the greater gain of the industry.

CONLUSIONS

The event collection exercise with a dozen construction companies across the country has generated a series of events that cover technical, operational and relationship issues. The follow-up debriefing sessions on those events assisted the participants to reflect on their experiences and transform their personal experience into explicit knowledge, making way for a wider range of knowledge sharing and dissemination. This suggests that audio diary records cum debriefing are effective tools for knowledge management within construction SMEs. As the research progresses, ways are being sought to allow the participating organisations operate these tools and the

knowledge management approach by themselves. If they succeed in doing so, the technique can then be promoted to the whole construction industry.

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